

Renewable Resources and Transmission

Scott Barnhart
American Transmission
Company
June 15, 2004



Accounting for Renewable Resources

- Interconnection and delivery
 - Interconnection request to MISO
 - Impact study by ATC
 - Facility study (if needed and requested) by ATC
 - Transmission service request to MISO
 - Impact study by ATC
 - Facility study (if needed and requested) by ATC

Planning for Renewable Resources

- Access initiative
 - All wind proposals that have had interconnection and delivery studies complete are included
 - Scenario analysis
 - Evaluate “high wind” scenario
 - 500-1000 MW in NW Iowa/SW Minnesota
 - Evaluate “high hydro” scenario
 - 600-1400 MW in northern Manitoba

Wind Development in Wisconsin

- 15 wind generators in MISO queue
- 2 have completed interconnection and delivery studies
- 1 has completed interconnection study
 - No transmission service requested to date
- 12 are in queue for interconnection studies

Completed Wind Generation Studies

Butler Ridge

- 54 MW in Dodge County
- Projected in-service: December 2004
- Connect to Rubicon-Hartford 138 kV line
- New 138/34.5 kV Butler Ridge substation required to interconnect
- Operating restrictions exist prior to installation of ATC-planned capacitor bank at Hartford
- Transmission service in 2008 and beyond conditioned on Port Washington and Elm Road reinforcements being completed

Completed Wind Generation Studies

Navitas

- 160 MW in Fond du Lac County
- Projected in-service: May 2005
- Connect to Forest Jct.-Arcadian 345 kV line
- New 345/34.5 kV Cypress substation required to interconnect
- Static var compensation and capacitor bank required for stability purposes
- Fox Energy-Forest Jct. 345 kV line uprate required
- Output limited for two different 345 kV line outages (for sustained outages)
- No other transmission service restrictions
- Estimated cost for G335 substation and line uprate: \$9.54M (excludes SVC and capacitor bank)

Other Factors/Considerations

- Impacts for generators are cumulative
 - Subsequent generator studies may show need for other reinforcements
 - Depends on amount and location
 - Depends on delivery direction
- Commonly required facilities
 - SVC
 - Capacitor banks

Conclusions – to date

- Impact of Butler Ridge wind project: benign
- Impact of G335 wind project: stability and thermal issues need to be addressed
- Studies for other wind projects in this area will include projects above
- Better sense of total impact on/capability of transmission system once study of all queue projects are completed

Getting Our Arms Around Wind Development in Wisconsin

- Need collaborative effort among developers to develop a comprehensive interconnection request
 - May be difficult due to competition
 - Unless customers are secured, deliverability requirements are unknown
- Deliverability from out-of-state markets to be coordinated through MISO